INTERNATIONAL NEWSLETTER ON PLANT PATHOLOGY

ISPP Newsletter 46 (9) September 2016

News and announcements from all on any aspect of Plant Pathology are invited for the Newsletter.
Contributions from the ISPP Executive,
Council and Subject Matter Committees, Associated Societies and Supporting Organisations are requested.
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Notice to ISPP Councillors - Selection of Host Society for ICPP2023.

One of the objectives of the International Society for Plant Pathology is to "sponsor a series of International Congresses of Plant Pathology", normally at intervals of 5 years. During March-August 2016, ISPP Associated Societies were invited to submit bids for the hosting of the 12th International Congress of Plant Pathology in 2023 (ICPP2023).

Selection of the location and date of each Congress is the responsibility of ISPP's Council, and is undertaken by a ballot on Congress bid proposals. The ISPP Council consists of the ISPP Executive Committee and the ISPP Councilors nominated by the member societies of the ISPP (see http://www.isppweb.org/about_associated_eng.asp).

The call for bids to host ICPP2023 is now complete and four bids have been received. During September-November 2016, ISPP Councilors will be asked to consider the submited bid documents and vote on their preferred host for ICPP2023.

In order to ensure the vote is as complete as possible, ISPP member Societies are asked to check and update their ISPP Councilor listings at http://www.isppweb.org/about_committees.asp. During August-September 2016, ISPP will be contacting the ISPP Council to check and confirm the accuracy of their contact detail

Voting will open by 30 September 2016 with first round voting to be completed by 31 October 2016. If a clear winning bid (two thirds of votes received) is not obtained in the first round, a second round of voting may occur in November 2016.

Peter Williamson ISPP Business Manager.

UN food agency leaders hail U.S. law aimed at boosting global food security

The UN World Food Programme (WFP) and the UN Food and Agriculture Organization (FAO) praised U.S. President Barack Obama for his 20 July signing of the Global Food Security Act (GFSA), after the bill was passed by the U.S. Congress on 6 July with remarkably broad support.

Strongly promoted by President Obama, the GFSA supports initiatives that focus on developing agriculture, assisting small-scale food producers and improving nutrition, especially for women and children worldwide. It also seeks to improve the provision of water, sanitation and hygiene to poor communities and build their resilience to withstand shocks, such as those stemming from conflict, droughts and floods.

Among other things, the GFSA writes into law the Feed the Future programme, the U.S. government's global hunger initiative, ensuring it will continue after the Obama presidency ends in January. Feed the Future helps

countries struggling to provide their citizens with adequate access to food. It emphasises the needs of smallholder farmers, particularly women, and has supported WFP's work in Uganda and other places.

The GFSA also authorizes for the first time USAID's International Disaster Assistance (IDA) and Emergency Food Security Program (EFSP). This means future White House administrations and future Congresses could more easily make cash assistance available to people experiencing hunger unexpectedly, due to causes such as natural disasters or war.

And the law aims to improve coordination among various U.S. agencies providing overseas aid, to ensure the wisest possible spending practices. The U.S. is the largest bilateral donor to both FAO and WFP.

The bill was passed with bipartisan support, meaning by members of both the Democratic and Republican parties, during a time of great division in U.S. politics. It was sponsored by U.S. Representatives Chris Smith and Betty McCollum and by U.S. Senators Johnny Isakson and Bob Casey.

(Food and Agriculture Organization of the UN, 25 July 2016)

Broad virus resistance in cucumber developed using CRISPR

Genome editing in plants has advanced due to the development of CRISPR/Cas9 technology. Jeyabharathy Chandrasekaran, together with other researchers from the Volcani Center in Israel, developed virus resistance in cucumber (*Cucumis sativus*) using Cas9/subgenomic RNA (sgRNA) technology to disrupt the function of the recessive eIF4E gene.

Cas9/sgRNA constructs were designed to target the N' and C' termini of the eIF4E gene. Small deletions and single nucleotide polymorphisms (SNPs) were observed in the eIF4E gene targeted sites of transformed T1 cucumber plants. Non-transgenic heterozygous eif4e mutant plants were then selected for the production of non-transgenic homozygous T3 generation plants.

Following Cas9/sgRNA that had been targeted to both eif4e sites, homozygous T3 exhibited immunity to Cucumber vein yellowing virus (Ipomovirus) infection and resistance to the potyviruses Zucchini yellow mosaic virus (ZMV) and Papaya ring spot mosaic virus-W (PRSV). In contrast, heterozygous mutant and non-mutant plants were highly susceptible to these viruses.

This study marks the first time that virus resistance was developed in cucumber, non-transgenically, via the CRISPR /Cas9 technology. This approach can also be applied to several crops.

For more on this study, read the full article in Molecular Plant Pathology.

(Crop Biotech Update, 24 August 2016)

How do pesticides protect crops?

Scientists from the University of Manchester have created a model of a leaf's wax surface similar to those found in wheat crops, in a project supported by the agrochemical company, Syngenta. They are now using the model at the Science and Technology Facilities Council's ISIS Neutron and Muon Source research facility to study how surfactants, a key component in pesticide formulations, interact with the leaf surface to get into the plant and take effect.

New research published in Interface could lead to the fine-tuning of pesticide formulations to further increase crop yield. The findings also show a way to develop advanced performance formulations which will interact reversibly with plant surfaces and will leave their protective cuticles unharmed.

Read more.

(ScienceDaily, 27 July 2016)

Plant diseases and management approaches in organic farming systems

A paper by A.H.C. van Bruggen and M.R. Finckh titled "Plant diseases and management approaches in organic farming systems" was published in August 2016 by Annual Review of Phytopathology (vol. 54 pp. 25-54). The abstract is as follows:-

Organic agriculture has expanded worldwide. Numerous papers were published in the past 20 years comparing plant diseases in organic and conventional crops. Root diseases are generally less severe owing to greater soil health, whereas some foliar diseases can be problematic in organic agriculture. The soil microbial community and nitrogen availability play an important role in disease development and yield. Recently, the focus has shifted to optimizing organic crop production by improving plant nutrition, weed control, and plant health. Crop-loss assessment relating productivity to all yield-forming and -reducing factors would benefit organic production and sustainability evaluation.

Read paper.

Stored grain research on the farm

The Plant Biosecurity Cooperative Research Centre and Mingenew-Irwin Group (MIG) have been working together in Western Australia on ways to manage stored grain insect pests. The partnership gives real benefits to growers, bringing research findings out of the lab and into the silos and paddocks, and giving MIG growers access to some of Australia's leading researchers as well as insights into the latest grain storage practices. Examples are research on aeration, which has demonstrated lower insect rates, reduced insect resistance and increased seed viability, and nitrogen technology, which has enormous potential for controlling grain pests via low oxygen environments in grain silos and can be both cost-effective and chemical-free.

https://vimeo.com/173721549

(Plant Biosecurity Cooperative Research Centre, The Leaflet, 29 July 2016)

Special issue on forest pathology and plant health in the journal Forests

The journal Forests is currently running a Special Issue entitled "Forest Pathology and Plant Health". Dr. Matteo Garbelotto, of the University of California-Berkeley, and Dr. Paolo Gonthier, of the University of Torino, are serving as Guest Editors for this issue.

Every year, a number of new forest pathosystems are discovered as the result of introduction of alien pathogens, host shifts and jumps, hybridization and recombination among pathogens, etc. Disease outbreaks may also be favoured by climate change and forest management. The mechanisms driving the resurgence of native pathogens and the invasion of alien ones need to be better understood in order to draft sustainable control strategies. For this Special Issue, we welcome population biology studies providing insights on the epidemiology and invasiveness of emergent forest pathogens possibly by contrasting different scenarios varying in pathogen and host population size, genetics, phenotype and phenology, landscape fragmentation, occurrence of disturbances, management practices, etc. Both experimental and monitoring approaches are welcome. In summary, this special issue focuses on how variability in hosts, pathogens, or ecology may affect the emergence of new threats to plant species.

Vector-Mediated Transmission of Plant Pathogens - new book

To fully understand the transmission of viruses through vectors, one must look at various parts of the whole, such as the vector's activities, the point(s) of inoculation, and the pathogen's effects on the plant at various levels, including the molecular, cellular, and visual.

A new book published by APS PRESS, titled Vector-Mediated Transmission of Plant Pathogens, helps unravel the complexities behind pathogen-vector interactions.

This comprehensive, 500+ page monograph for students and experts of vector biology covers all major vector types, key pathogens, and details of their interactions, including:

- The various types of vectors involved, including arthropods, mites, fungi, and organisms once classified as fungal pathogens, nematodes, and trypanosomatids
- A variety of key pathogens, including eubacteria, fungi, plant pathogenic nematodes, as well as plant RNA and DNA viruses
- The many mechanistic and ecological roles related to vector-mediated transmission
- The pathogen's coevolved interactions with particular type and parts of the vector at hand
- The defined pathways between the vector and host
- Specific retention-inoculation characteristics in relation to the vector and plant host

Each chapter of this seven-part book gives the reader detailed examples of particular pathogen-vector interaction modes, tying together many years of research to advance the understanding of pathogen-vector biology and interactions at biochemical, cellular-tissue-organ, and functional genomics levels.

The final seventh section includes short treatises on a number of emerging pathogen-vector complexes which require further research, written with the goal of inspiring students and researchers to continue pioneering this important field.

A detailed description of this book can be found on APS Press website.

A fungal endophyte helps plants to tolerate root herbivory

A paper by M. Cosme et al. titled "A fungal endophyte helps plants to tolerate root herbivory through changes in gibberellin and jasmonate signaling" was published in August 2016 by New Phytologist (vol. 211 pp. 1065-

1076). It is an open access paper. The abstract is as follows:-

- Plant-microbe mutualisms can improve plant defense, but the impact of root endophytes on below-ground herbivore interactions remains unknown. We investigated the effects of the root endophyte *Piriformospora indica* on interactions between rice (*Oryza sativa*) plants and its root herbivore rice water weevil (RWW; *Lissorhoptrus oryzophilus*), and how plant jasmonic acid (JA) and GA regulate this tripartite interaction.
- Glasshouse experiments with wild-type rice and coi1-18 and Eui1-OX mutants combined with nutrient, jasmonate and gene expression analyses were used to test: whether RWW adult herbivory above ground influences subsequent damage caused by larval herbivory below ground; whether *P. indica* protects plants against RWW; and whether GA and JA signaling mediate these interactions.
- The endophyte induced plant tolerance to root herbivory. RWW adults and larvae acted synergistically via JA signaling to reduce root growth, while endophyte-elicited GA biosynthesis suppressed the herbivore-induced JA in roots and recovered plant growth.
- Our study shows for the first time the impact of a root endophyte on plant defense against below-ground herbivores, adds to growing evidence that induced tolerance may be an important root defense, and implicates GA as a signal component of inducible plant tolerance against biotic stress.

Read paper.

Spiroplasma turns tropical butterfly into male killer

The authors of the paper, published in the Royal Society journal Proceedings of the Royal Society B, have identified a male-killing microbe, Spiroplasma, in a tropical butterfly called the African Queen, which leads to the death of all sons when a mother is infected. In most of Africa, the Spiroplasma infection has no effect on their offspring, however, in a narrow zone around Nairobi in Kenya, where two sub species of butterfly live and breed, the infection caused all their sons to die. It is believed that this is the first step in the transition of the two sub-species into two true, non-interbreeding, species.

Download open access paper:
David A. S. Smith, Ian J. Gordon, Walther Traut, Jeremy Herren,Steve Collins, Dino J. Martins, Kennedy Saitot, Piera Ireri and Richard Ffrench-Constant (2016) A neo-W chromosome in a tropical butterfly links colour pattern, male-killing and speciation. Royal Society journal Proceedings of the Royal Society B 283, 20160821.

Read more.

(University of Exeter News, 20 July 2016)

Cucumber mosaic virus attracts bees

Glover and a team from Cambridge's Virology and Molecular Plant Pathology have found that Cucumber mosaic virus (CMV) does more than kill the plants-it makes them attractive to bees, which flock to the infected vegetation. Their results are published in the journal PLOS Pathogens.

The team grew tomato plants in a greenhouse then infected them with CMV. Plants naturally produce volatile organic compounds, some of which attract pollinators and others that repulse potential predators. What they found was that the virus changed the composition of the volatiles emitted by the tomato plant. When they released bumblebees into their greenhouses, the insects headed to the infected plants first and spent more time spreading their pollen around.

CMV predisposes the bees to choose the disease susceptible plants, meaning those individuals produce more seeds of plants that are vulnerable to the virus. This allows the plant to reproduce and gives the virus plenty of disease-susceptible future hosts. The newly discovered phenomenon could lead to better crop yields if researchers can figure out exactly how the virus modifies volatile compounds to attract more pollinators.

Read more.

(Jason Daley, Smithsonian.com, 15 August 2016)

Europe and China join forces against pests

Scientists from the European Union (EU) and China have joined forces in a project to develop new methods of integrated pest management in agriculture. The European and Chinese are working to guarantee a more sustainable control of pests such as whitefly (Besimia tabaci), as reported to Hortoinfo via the Institute of Agro-food Research and Technology (IRTA) of the Government of Catalonia.

The project, called EUCLID (EU-CHINA Lever for IPM Demonstration), brings together researchers from five European countries, working together with China to identify the most sustainable methods of agricultural management that do not require any chemical pesticides.

The aim is to provide scientific support to the policies of the European Union and China in order to improve the quality of agricultural products and their environmental impact, and to facilitate the exchange between the two regions. The goal is to optimise current pest control methods and develop new ones based on integrated pest management, as well as to promote their application.

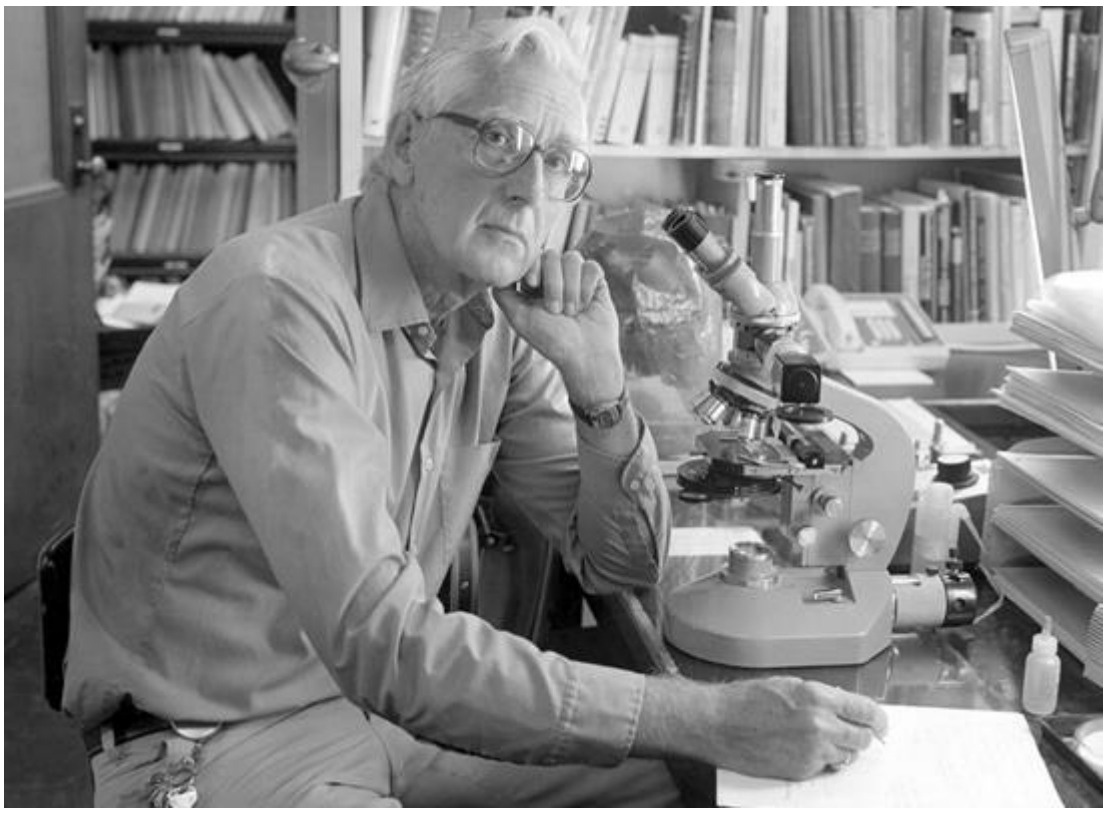
The project entails the development of innovative systems of integrated pest management, the transfer of results to growers and the industry, as well as promotions of the benefits of chemical-free farming targeted to consumers.

The project, funded by the European Commission under the Horizon 2020 program, started in September 2015 and will last for four years.

More info on project.

(Fresh Plaza, 9 August 2016)

Richard Korf (1925 - 2016)



Noted plant pathologist, scholar and mentor Richard P. Korf, Professor Emeritus of Mycology, died 20 August at his Ithaca home. He was 91 years old.

Korf had a major impact in the field of mycology, where he specialised in a group of fungi called Discomycetes, or cup fungi, which include morel and truffle mushrooms and other cup-shaped fungi. He described or reclassified many hundreds of fungal species.

"He was a world leader in the understanding and taxonomy of Discomycetes; there are now three genera and at least 16 species of fungi named after him, including the locally common false morel, *Gyromitra korfii,*" said Kathie Hodge, Associate Professor of Mycology in the Plant Pathology and Plant-Microbe Biology Section of the School of Integrative Plant Science.

Another area where Korf had a significant impact was in how fungi are named. He fought for rule changes to make assigning names to species more logical and practical, Hodge said. As an authority in the field, many colleagues relied on his advice on naming newly discovered fungi, she said.

Korf co-founded the journal Mycotaxon in 1974 with a friend, Gregoire Hennebert. The journal promotes rapid

publication of discoveries in fungal biodiversity by allowing authors to format papers and assign reviewers themselves.

At Cornell, Korf directed Cornell University's Plant Pathology Herbarium, the fifth-largest herbarium of fungi in North America. Korf's contributions include specimens from expeditions to Japan, Bermuda, Macaronesia and Southeast Asia, plus local New York fungi. His personal collection comprises 5,000 specimens of fungi, including 257 types - each the first of its kind to be named.

Along with publishing more than 400 papers on cup fungi and fungal nomenclature, Korf trained and advised 27 graduate students and eight postdoctoral researchers. "Richard Korf mentored many of the prominent fungal taxonomists in the world today," said Gary Bergstrom, Chair of the Plant Pathology and Plant-Microbe Biology Section. "He had a great store of knowledge and used it generously and gracefully," Hodge said. "The pride he took in his many students was a real gift to receive."

Hailing from Westchester County, New York, and New Fairfield, Connecticut, Korf received his bachelor's degree in botany in 1946 and his doctorate in plant pathology and mycology in 1950. He joined Cornell's faculty in 1951 in the Department of Plant Pathology; he retired in 1992. During his career, Korf travelled and taught in Japan, Canada, Denmark and China, among other places.

His many honours and awards include an Ainsworth Medal for extraordinary service to international mycology from the International Mycological Congress (2010); selection as a British Mycological Society Centenary Fellow (1996); a Gamma Sigma Delta Cornell Chapter 1992, Distinguished Teaching Award (1993); a State University of New York Chancellor's Award for Excellence in Teaching (1992); and a Distinguished Mycologist Award from the Mycological Society of America (1991).

(Krishna Ramanujan, Cornell Chronicle, 27 August 2016)

Acknowledgements

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